

# OPERATING MANUAL

D U A L C H A N N E L  
**COMPRESSOR**  
L I M I T E R W I T H G A T E

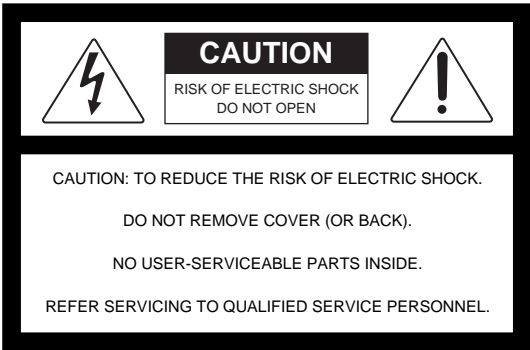
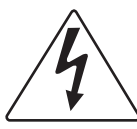

**CN-9102**

**interM**

## UNPACKING AND INSTALLATION

Although it is neither complicated to install nor difficult to operate your PA amplifier, a few minutes of your time is required to read this manual for a properly wired installation and becoming familiar with its many features and how to use them. Please take a great care in unpacking your amplifier and do not discard the carton and other packing materials. They may be needed when moving your set and are required if it ever becomes necessary to return your set for service.

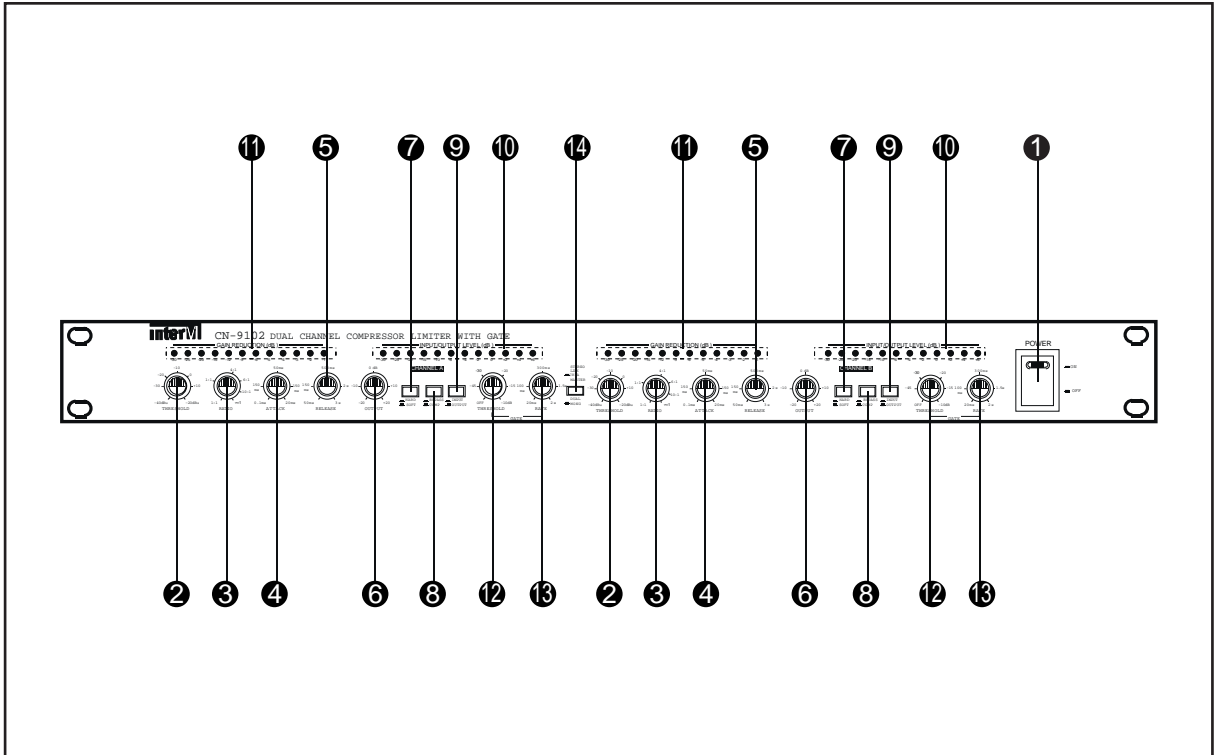
Never place the unit near radiators, in front of heating vents, in excessively humid or dusty location to avoid early damage and for your years of quality use. Connect your complementary components as illustrated in the following page.

	 <p>This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.</p>  <p>This symbol is intended to alert the user to the presence of important operation and maintenance (servicing) instructions in the literature accompanying the appliance.</p>
<p><b>WARNING</b></p> <p>To prevent fire or shock hazard, do not expose the unit to rain or moisture.</p>	<p>Caution: To prevent electric shock do not use this (polarized) plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.</p> <p>Attentions: Pour prévenir les chocs électriques ne pas utiliser cette fiche polarisée avec un prolongateur, une prise de courant ou une autre sortie de courant, sauf si les lames peuvent être insérées à fond sans en laisser aucune partie à découvert.</p>

## FEATURES

- The CN-9102 is a high quality, versatile, dual-channel professional compression unit.
- The CN-9102 offers consistently great result for studio recording, live sound or broadcast application.
- The CN-9102 offers Ratio, Attack and Release controls to customize its compression response for even toughest signal.
- You can choose between Hard and Soft Knee dynamic curve for every application.
- As an independent dual-channel compressor, the CN-9102 offers separate controls for two different source.
- Fully independent gates with threshold and rate controls.
- Precise signal metering, a side chain for keying or ducking effects and stereo linkable operation.

## FRONT PANEL CONTROLS



### 1. POWER SWITCH

This switches mains power on or off.

### 2. THRESHOLD CONTROL

This control sets the threshold point for the compression section. It has a range of  $-40\text{dB}$  ~  $+20\text{dB}$ . The Soft Knee characteristic is applied to the signal exceeding the threshold point by a maximum of  $10\text{dB}$ . Above  $10\text{dB}$ , the signal would experience Hard Knee compression.

### 3. RATIO CONTROL

This control sets the degree of compression applied above the threshold level, variable from  $1:1$  to  $\infty:1$ . A ratio of  $1:1$  corresponds to zero compression. A ratio of  $10:1$  indicates that when the input signal, above the threshold level, rises in level by  $10\text{dB}$ , the output level will rise  $1\text{dB}$ .

### 4. ATTACK CONTROL

This control sets the time taken for compression to commence after the threshold is exceeded, from  $0.1$  milliseconds to  $200$  milliseconds.

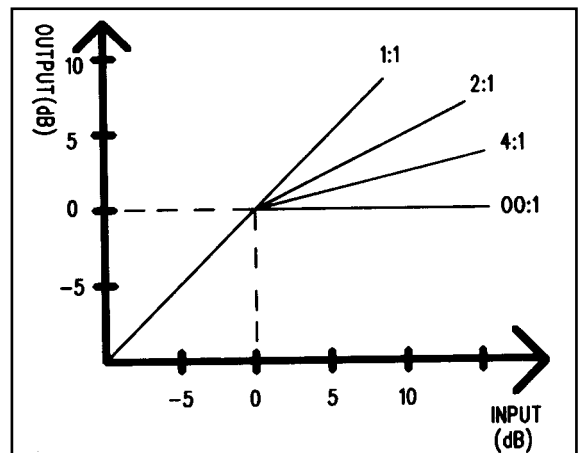


Fig. 1. THRESHOLD/RATIO

## 5. RELEASE CONTROL

This control determines the time taken for the gain to return to normal after the signal drops below the threshold level, adjustable from 50 millisecond to 3 second.

## 6. OUTPUT CONTROL

This control allows for the increase or decrease of the input signal by a maximum of 20dB. Thus, a level loss due to the compression or limiting process can be compensated for.

## 7. SOFT/HARD KNEE SWITCH

This switch adjusts the “HARD KNEE” or “SOFT KNEE” of the compression effect. A hard knee means that when the input signal level rises above the threshold, it is immediately compressed at the full ratio as set. A soft knee means that compression will start below the threshold level at a low ratio and gradually attain the full ratio selected only at higher levels.

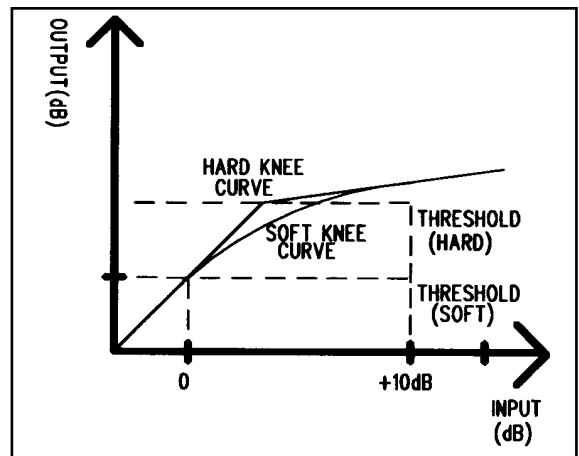


Fig. 2. SOFT/HARD KNEE

## 8. BYPASS SWITCH

The bypass switch selects the whole unit to be in or out of circuit.

## 9. IN/OUT SWITCH

## 10. IN/OUT LEVEL METER

This 12-stage INPUT/OUTPUT LEVEL meter constantly monitors the level of the input or output signal level depending on the position of the 9. IN/OUT SWITCH.

The displayed level range lies between -30 to +6dB. When the switch is in the OUT position, the meter monitors the output signal, whereas in the IN position the input signal is monitored. The meter is referenced to an operating level using the switch provided at the rear of the unit which is able to select between -10dB and +4dB.

## 11. GAIN REDUCTION METER

The 12-stage GAIN REDUCTION meter informs you of the actual gain reduction and displays this in a range of -1 to -30dB.

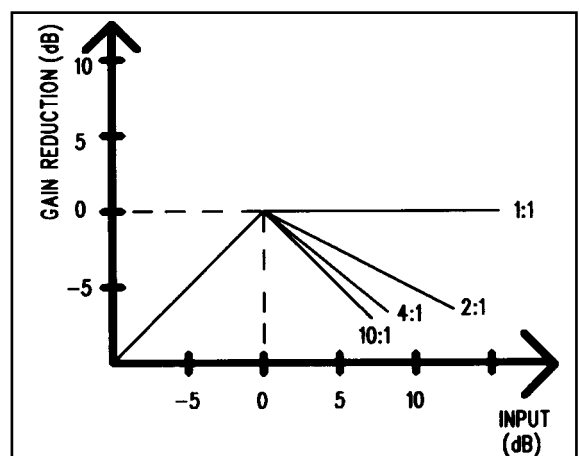


Fig. 3. GAIN REDUCTION

## 12. THRESHOLD/GATE CONTROL

This control sets the signal level at which the gate will be opened in the gating mode or closed in the ducking mode. It is variable infinity to -10dB. For normal noise removal application, it is usual to set the THRES-HOLD as low as is possible without spurious triggering occurring so that none of the wanted signal will be lost.

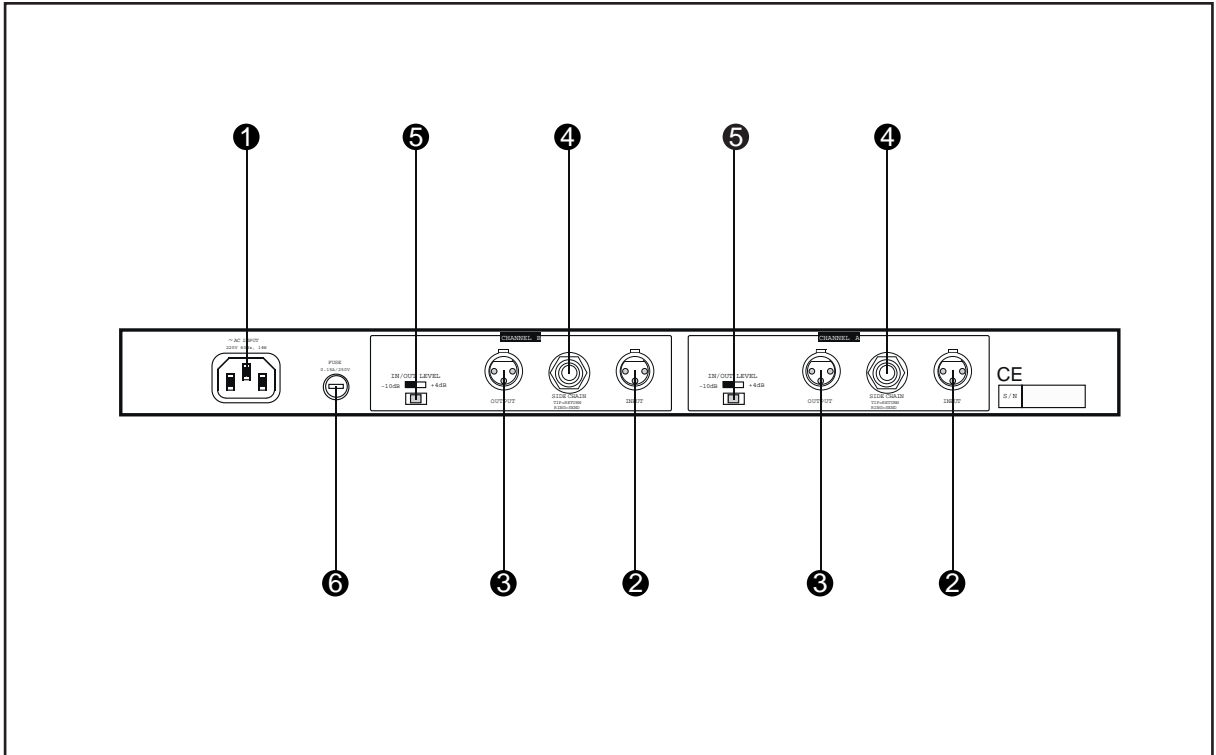
## 13. RATE/GATE CONTROL

Once the input signal has fallen the THRESHOLD level, the gate closes at a rate set by this control. The rate time is variable from 20 millisecond to 2 second.

## 14. STEREO LINK SWITCH

Stereo links the two channels of the CN-9102 together, so that they are both operated from the controls of channel A. In stereo mode, the unit still monitors the level of both channels to detect when the signal is above the threshold level.

## REAR PANEL FUNCTION



### 1. AC INPUT CONNECTOR

Please use the enclosed main cable to connect the unit to the main power supply.

### 2. BALANCED AUDIO INPUT

There are 3 pin XLR type input connectors, one for each channel. Pin 2 is high, pin 3 is low, pin 1 is ground. Each input circuit is balanced, but they may be individually wired for balanced operation.

### 3. BALANCED AUDIO OUTPUT

There are 3 pin XLR type output connectors, one for each channel. Pin 2 is high, pin 3 is low, pin 1 is ground. Each output circuit is balanced, but they may be individually wired for balanced operation.

### 4. SIDE CHAIN

There are two 1/4 inch phone jack, one for each channel, which are the unbalance side chain or key in/out to the side chain circuit. TIP=RETURN, RING=SEND.

### 5. OPERATING LEVEL SWITCH

This switch allows the CN-9102 to be adapted to various operating levels. You can choose between the home recording level (-10dB) or professional studio level (+4dB). This automatically changes the metering of the unit to represent the nominal levels and permits the CN-9102 to work to its optimum dynamic range.

## THE BASIC TECHNOLOGY

It is possible to manufacture audio equipment with a dynamic range of up to 125dB. In contrast to analog technique, the dynamic range of digital equipment is approximately 25dB less. Current digital recording techniques typically achieve 85dB of dynamic range for record and playback. Analog tape recording can record and reproduce up to about 74dB of dynamic range. FM broadcasting and analog record cutting processes yield about 65dB of dynamic range. AM broadcasting yield about 50dB.

All electrical components produce a certain level of inherent noise. Current flowing through a conductor lead to uncontrolled random electron movements. For statistical reasons, this produces frequencies within the whole audio spectrum. If these currents are highly amplified, the result will be perceived as noise. Since all frequencies are equally affected. We term this white noise. It is fairly obvious that electronics cannot function without components. Even if special low-noise components are used, a certain degree of basic noise cannot be avoided. The effect is similar when replaying a tape. The unidirectional magnetic particles passing the replay head can also cause uncontrolled and voltages. The resulting sound of the various frequencies are heard as noise. A remarkable feature of the human ear is, that it can detect the most wide ranging amplitude change- from the slightest whisper to the deafening roar of a jet-plane. If one tried to record or reproduce this wide spectrum of sound with the help of amplifiers, cassette recorders, records or even digital recorders, one would immediately be restricted by the physical limitations of electronic and acoustic sound reproduction technology.

The usable dynamic range of electro-acoustic equipment is limited as much at the low end as all the high end. The thermal noise of the electrons in the components results in an audible basic noise floor and thus represents the bottom limit of the transmission range. The upper limit is determined by the level of the internal operating voltages; if they are exceeded, audible signal distortion is the result. Although in theory, the usable dynamic range sits between these two limits, it is considerably smaller in practice, since a certain reverse must be maintained to avoid distortion of the audio signal if sudden level peaks occur. Technically speaking, we refer to this reverse as HEADROOM – usually this is about 10-20dB. A reduction of the operating level would allow for greater headroom, i.e. the basic noise floor of the programme material would be increased considerably. It is therefore useful to keep the operating level as high as possible without risking signal distortion in order to achieve optimum transmission quality. It is possible to further improve the transmission quality by constantly monitoring the programme material with the aid of volume fader, which manually levels the material. During low passages the gain is increased, during loud passages the gain is reduced. Of course it is fairly obvious that this kind of manual control is rather restrictive; it is difficult to detect signal peaks and it is almost impossible to level them out. Manual control is simply not fast enough to be satisfactory. The need therefore arises for a fast acting automatic gain control system which will constantly monitor the signals and which will always adjust the gain to maximize the signal-to-noise ratio without incurring signal distortion.

## COMPRESSORS / LIMITERS

By measuring the dynamic range of musical instruments in live recording situations, you will experience that extreme amplitudes will occur which will often lead to overload in subsequent signal processing equipment. Especially in broadcasting and in record cutting techniques, these signal peaks can lead to heavy distortion. To avoid this kind of distortion or, for example, to avoid loudspeaker being damaged by overload. *Compressors or Limiters* are used.

The principle function used in these devices is dependent on an automatic gain control as mentioned in the previous section, which reduces the amplitude of loud passages and therefore restricts the original dynamics to a desired range. This application is useful especially in microphone recording technique, to compensate for level changes which are caused by varying microphone distances.

Although compressors and limiters perform similar tasks, one essential point makes them different:

*limiters* abruptly limit the signal above a certain level, while compressors control the signal “gently” over a wider range. A limiter continuously monitors the signal and intervenes as soon as an adjustable threshold level is exceeded. This level is called the threshold. Any signal exceeding this threshold will be immediately reduced back to the adjusted threshold level.

A *compressor* also monitors the programme material continuously and also has a certain threshold level. However, in contrast to the limiter, signals exceeding the threshold are not reduced abruptly but gradually. Above the threshold, the signal is reduced in level, relative to the amount the signal exceeds this point.

Generally, threshold levels for compressors are set below the normal operating level to allow for the upper dynamics to be musically compressed. For limiters, the threshold point is set above the normal operating level in order to provide reliable signal limiting and thus protects subsequent equipment.

## NOISE-GATES

Audio in general is only as good as the source from which it was derived. The dynamic range of signals will often be restricted by noise. Synthesizers, effects devices, guitar pickups, amplifiers etc. mostly produce a high level of noise, hum or other ambient background hiss, which can disturb the quality of the programme material.

Normally these noises are inaudible if the level of the desired signal lies significantly above the level of the noise. This perception by the ear is based on the “masking” effect: noise will be masked and thus becomes inaudible, as soon as considerably louder sound signals in the same frequency band are added. Nevertheless, the further the level that the desired signal decreases, the more the noise floor becomes a disturbing factor.

*Expanders or noise-gates* offer a solution for this problem: these devices attenuate signals when their amplitudes drop, thereby fading out the background noise. Reliant on this method, gain controlling amplifiers, like expanders, can extend the dynamic range of a signal and are therefore the opposite of a compressor.

In practice, it is shown that an expansion over the entire dynamic range is not desired. With an expansion ratio of 5:1 and a processed dynamic range of 30dB, an output dynamic range of 150dB will be the result, exceeding all subsequent signal processors, as well as human hearing. Therefore, the amplitude control is restricted to signals, whose levels are below a certain threshold. Signals above this threshold pass through the unit unchanged. Due to the continuous attenuation of the signals below this threshold, this kind of expansion is termed “downward” expansion.

The *noise-gate* is the simplest form of an expander: in contrast to the expander, which continuously attenuates a signal below the threshold, the noise-gate cuts off the signal abruptly. In most applications this method is not very useful, since the on/off transition is too drastic. The onset of a simple gate function appears very obvious and unnatural. To achieve an inaudible processing of the programme material, it is necessary to be able to control the signal’s envelope parameters.

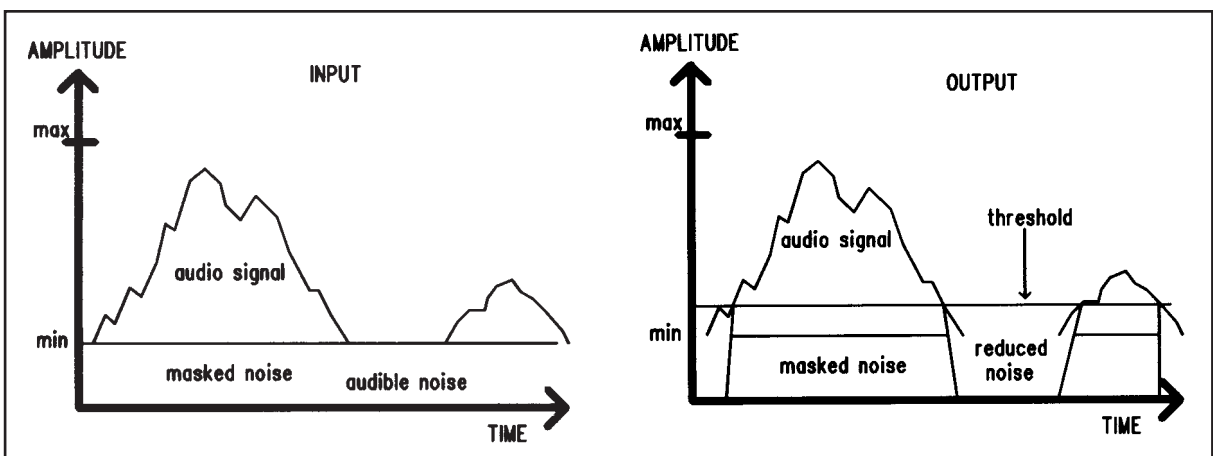


Fig. 4. NOISE GATE

CONNECTION

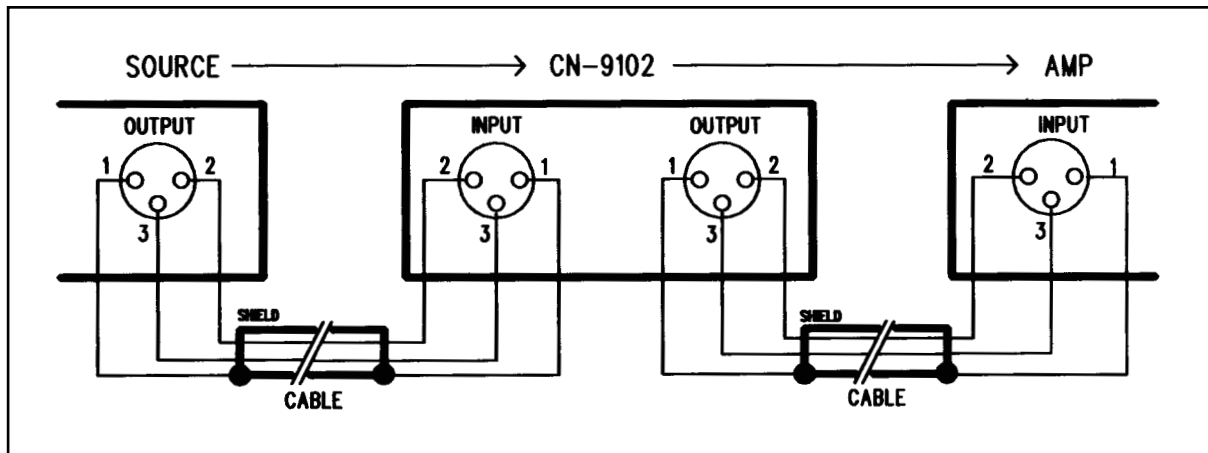


Fig. 5. Balanced System Wiring

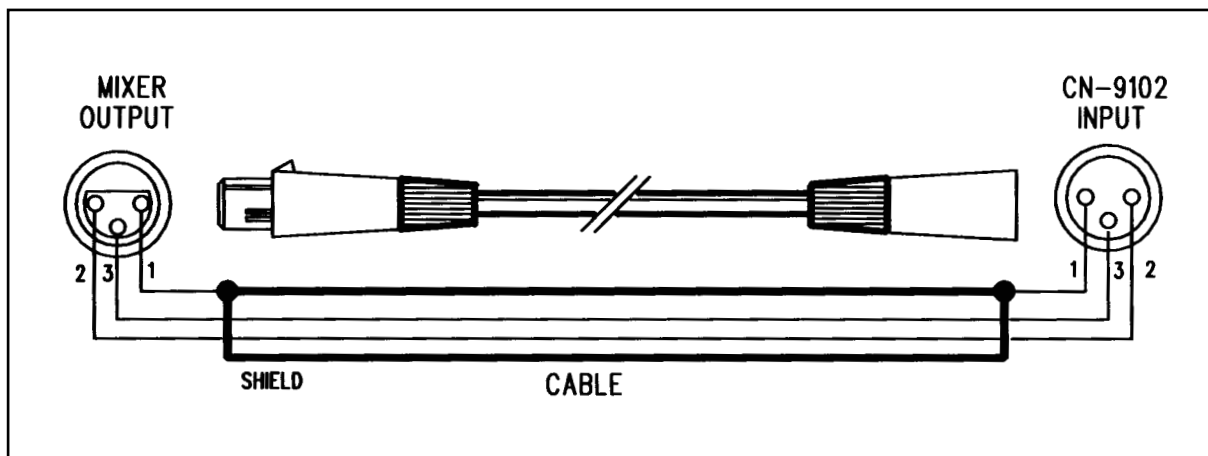


Fig. 6. Balanced Input Using XLR Connectors

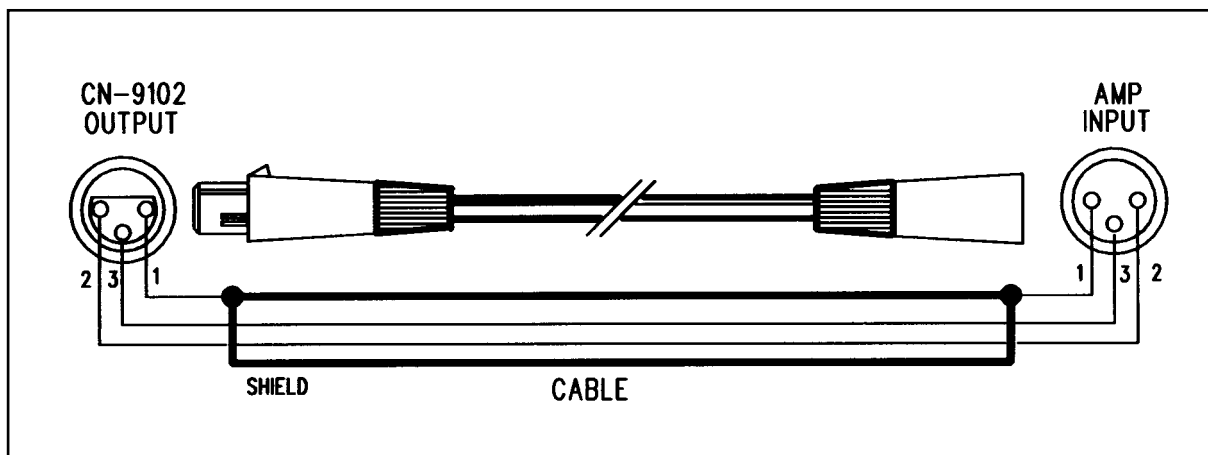


Fig. 7. Balanced Output Using XLR Connectors

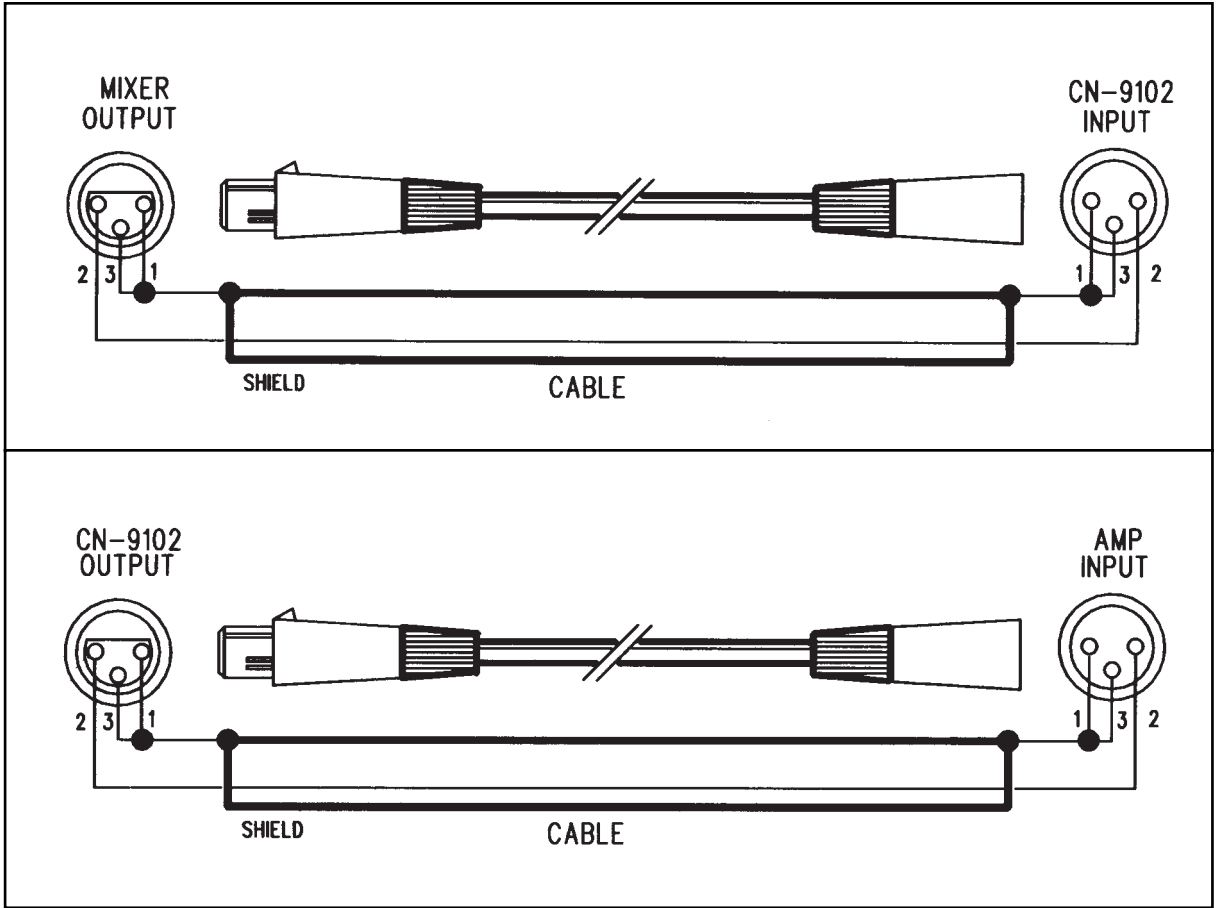


Fig. 8, Fig. 9. Unbalanced Input/Output Using XLR Connector

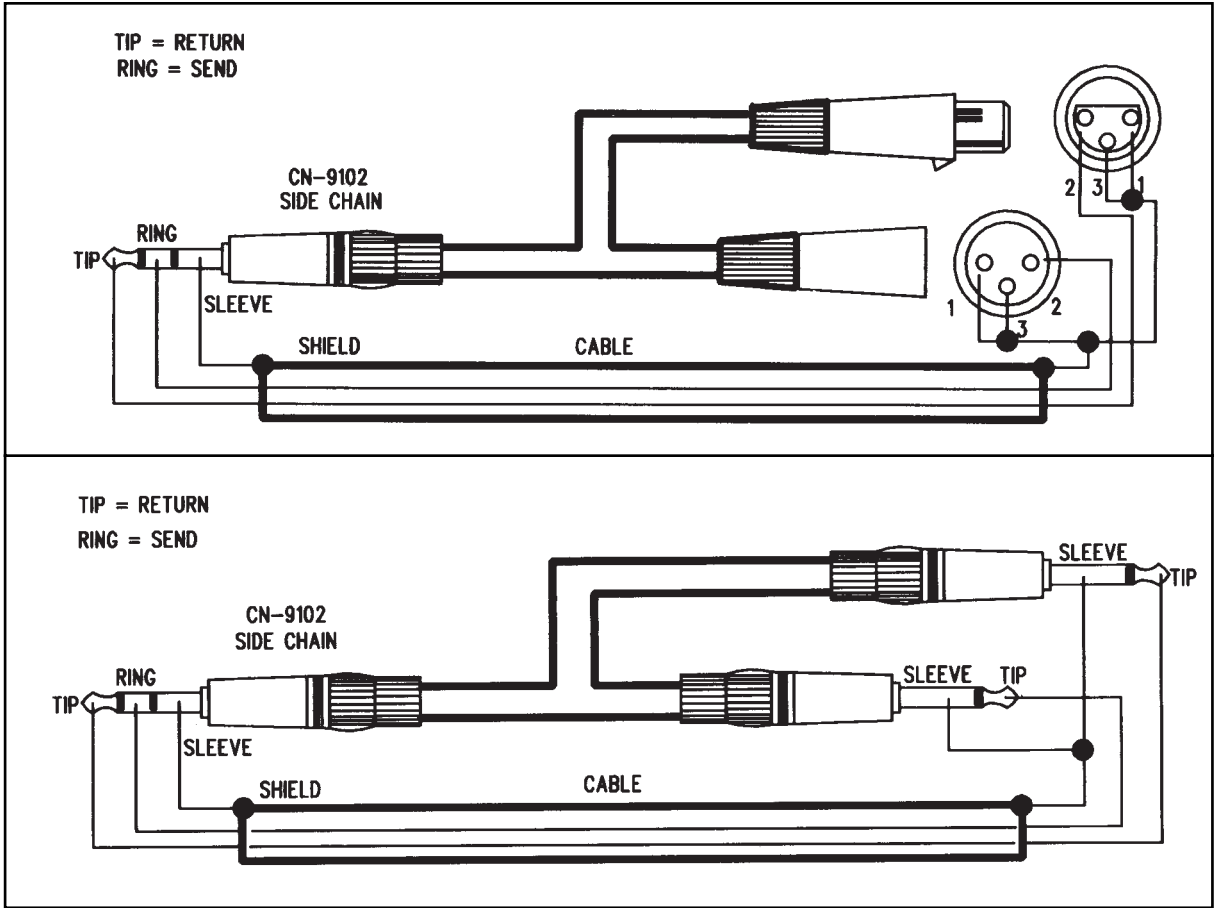
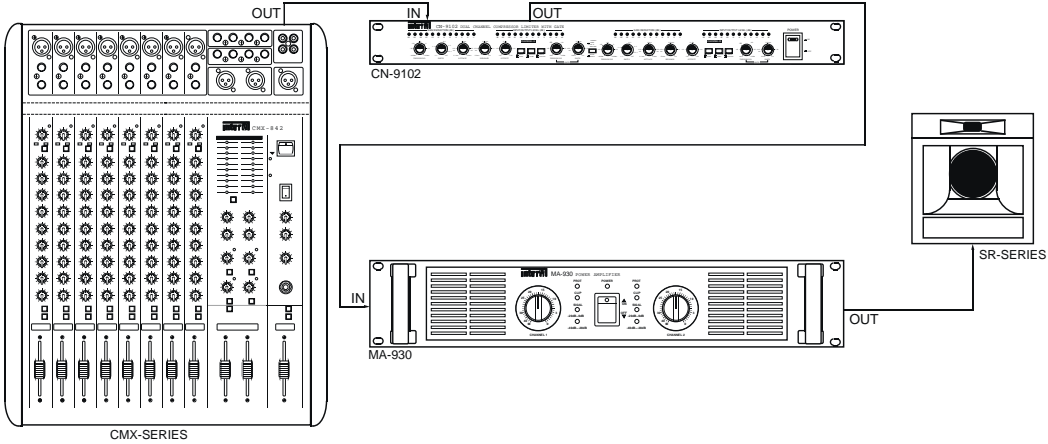


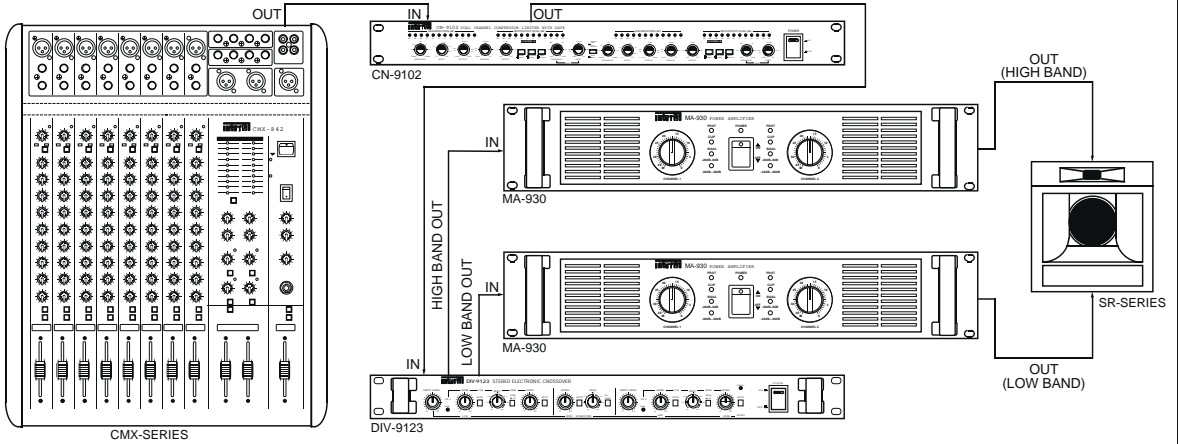
Fig. 10, Fig. 11. Side Chain Wiring

## APPLICATION-1

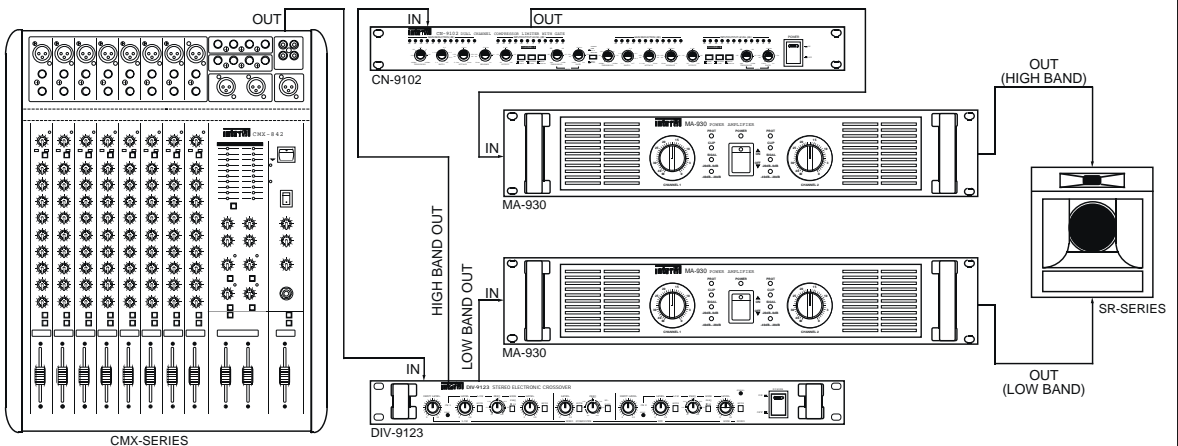
### 1. PASSIVE CROSSOVER NETWORK APPLICATION



### 2. TWO-WAY SYSTEM APPLICATION

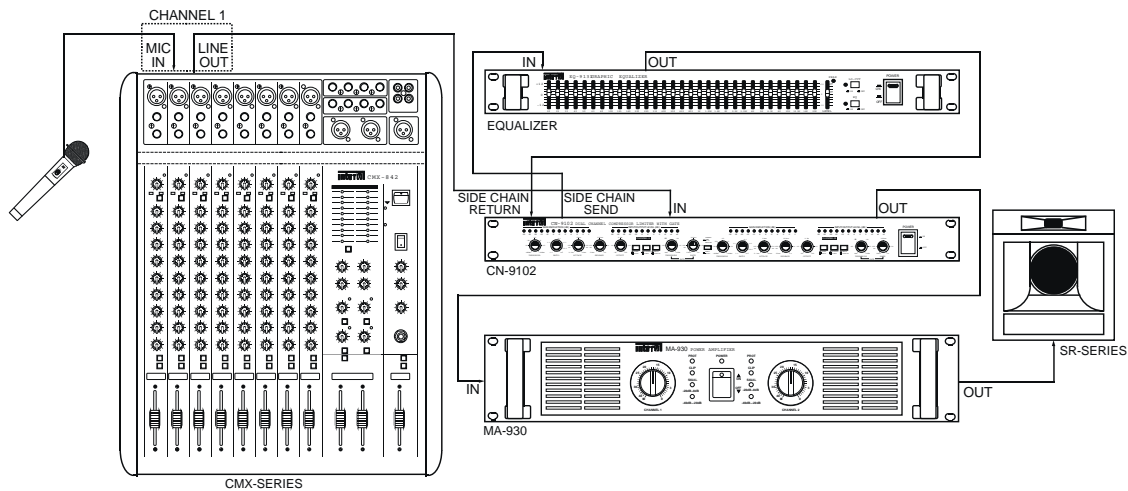


### 3. COMPRESSING HIGH-FREQUENCY APPLICATION

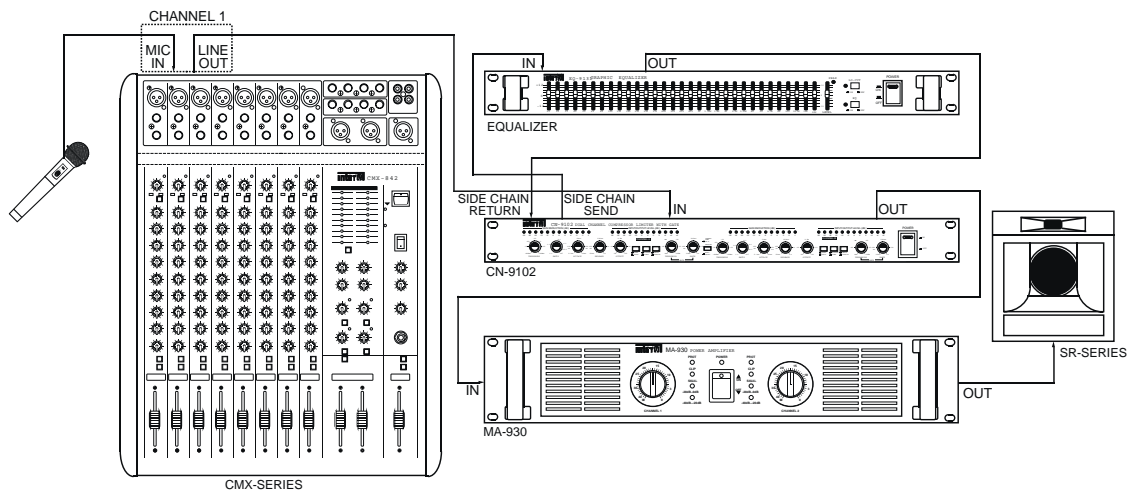


APPLICATION-2

4. DE-EASNG APPLICATION



5. FEEDONG FEEDBACK APPLICATION



## SPECIFICATIONS

### ■ AUDIO INPUT

- Type ..... Electronic balanced input
- Impedance ..... 47K $\Omega$
- Nominal Operating Level ..... +4dBv/-10dBu switchable
- Max Input Level ..... +20dBu balanced and unbalanced @ +4dBv

### ■ SIDE CHAIN

- Type ..... Unbalanced Tip=return, Ring=send
- Impedance ..... >22K $\Omega$ , <150 $\Omega$
- Max Input/Output Level ..... +20dBu

### ■ AUDIO OUTPUT

- Type ..... Electronic balanced output
- Impedance ..... <75 $\Omega$  balanced and unbalanced
- Max Input Level ..... +21dBm
- THD ..... 0.1% less than
- Noise & Hum @ Unit Gain ..... >-94dBu
- Crosstalk ..... >-85dBu
- Frequency Response ..... 5Hz ~ 50KHz (-1dB)

### ■ GATE SECTION

- Threshold ..... Variable (-60dB to -10dB)
- Rate ..... Variable (20ms to 2s)

### ■ COMPRESSOR SECTION

- Type ..... Hard & soft knee switchable
- Threshold ..... Variable (-40dB to +20dB)
- Ratio ..... Variable (1:1 to  $\infty$ :1)
- Attack ..... Variable (0.1ms to 200ms)
- Release ..... Variable (50ms to 3s)
- Output ..... Variable (-20dB to +20dB)

### ■ INDICATORS

- 12 Element Gain Reduction Meter ..... -30/-25/-20/-15/-12/-9/-6/-5/-4/-3/-2/-1
- 12 Element Input/Output Level Meter ..... -30/-25/-20/-15/-10/-6/-4/-2/0/+2/+4/+6

### ■ POWER SUPPLY

- Fuse ..... 160mA(120Vac), 80mA(220Vac)
- Main Connection ..... Standard IEC Receptacle

### ■ PHYSICAL ..... Standard 1 size rack

### ■ GENERAL

- Power Source ..... AC 110V~240V, 50 /60Hz
- Power Consumption ..... 19 Watts
- Weight ..... 3.5kg/7.7lb
- Dimensions ..... 482(W)  $\times$  44(H)  $\times$  280(D) mm  
19(W) $\times$ 1.75(H) $\times$ 11(D)in

\*Specifications and design subject to change without notice for improvements.

**interM**

MADE IN KOREA